

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of
the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- BLURRY OR ILLEGIBLE TEXT
- SKEWED/SLATED IMAGES
- COLORED PHOTOS
- BLACK OR VERY DARK BLACK AND WHITE PHOTOS
- UNDECIPHERABLE GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

This Page Blank (uspto)

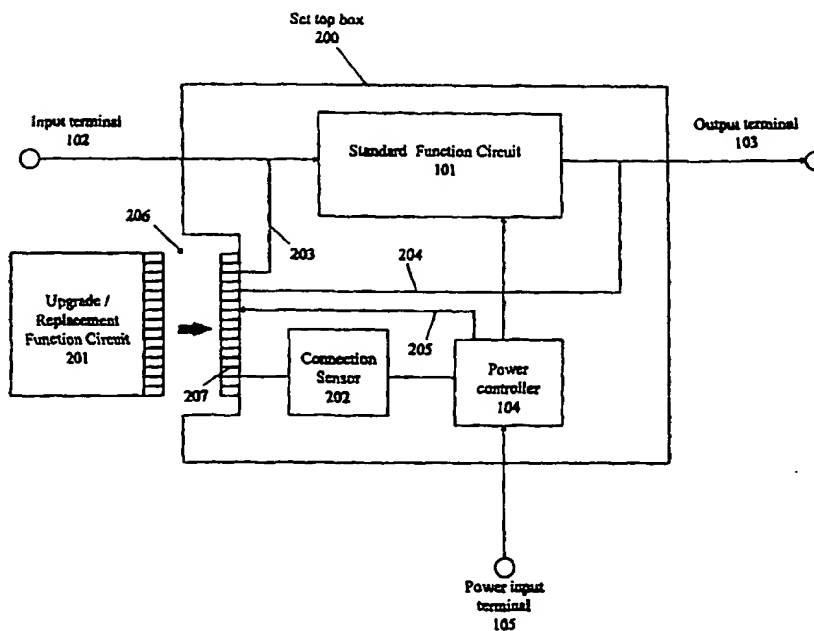
PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : H04H 1/02, H04N 7/10		A1	(11) International Publication Number: WO 99/21309
			(43) International Publication Date: 29 April 1999 (29.04.99)
(21) International Application Number: PCT/US98/22686 (22) International Filing Date: 22 October 1998 (22.10.98) (30) Priority Data: 60/062,622 22 October 1997 (22.10.97) US 09/001,631 31 December 1997 (31.12.97) US (71) Applicant: GENERAL INSTRUMENT CORPORATION [US/US]; 101 Tournament Drive, Horsham, PA 19044 (US). (72) Inventors: LANDGRAF, Henry, S. ; 39 Lafferty Drive, Cherry Hill, NJ 08002-1649 (US). POLA, Vijay, K. ; 204 Tree Lane Drive, Landsdale, PA 19446 (US). (74) Agents: KANANEN, Ronald, P. et al. ; Rader, Fishman & Grauer, PLLC, Suite 501, 1233 20th Street, N.W., Washington, DC 20036 (US).		(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	

(54) Title: METHOD AND APPARATUS FOR UPGRADING FEATURES AND FUNCTIONS OF A SET TOP BOX IN THE FIELD



(57) Abstract

A method and apparatus allow the function circuitry of a set top box (100) to be readily upgraded or replaced in the field. Replacement or upgraded function circuitry is provided in a self-contained module (201). The set top box (100) is provided with a port (206) through which the module (201) can be electrically connected to the set top box (100). Insertion of the module (201) either bypasses existing function circuitry (101) or is the only function circuitry available to the set top box (100).

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

TITLE OF THE INVENTION

Method and Apparatus for Upgrading Features and Functions of a Set Top Box in the Field.

FIELD OF THE INVENTION

5 The present invention relates to the upgrading of features and functions provided by a set top box in an audiovisual audio programming delivery system. More particularly, the present invention relates to a method and apparatus for rapidly upgrading a set top box by
10 making the function circuit of the box modular or bypassed by a secondary module plugged into a port of the set top box.

BACKGROUND OF THE INVENTION

15 Private systems for delivering audiovisual programming to authorized subscribers are popular and widely used throughout the world. Cable television is a prime example of such a system. Additionally, a private system for delivering audiovisual programming to authorized subscribers may be a pay-per-view system
20 in a residence or in a public establishment such as a hotel, or a communication system used by an organization, private or governmental, to provide audiovisual programming to members of the organization.

25 The basic premise of private systems for delivering audiovisual programming to authorized subscribers is that only authorized subscribers should be able to receive the programming. In the interests of security, privacy or to enable the provider to charge a fee for the programming, those who are not
30 authorized subscribers must be prevented from receiving the programming.

35 The traditional, straightforward method of excluding unauthorized parties from accessing the transmitted audiovisual programming is for the programming provider to scramble or encode the signal

carrying the programming prior to transmission.

Authorized subscribers who have paid for the programming or who are cleared to receive the programming are provided with a descrambler or decoder
5 unit which unscrambles or decodes a signal carrying the programming.

After the signal is unscrambled or decoded the programming can be properly perceived by the authorized subscriber. This decoder unit is referred to as a set
10 top box, the set being the monitor, tuner or other device with which the transmitted programming is received. Unauthorized parties who do not have the set top box will be unable to receive the audiovisual programming in an intelligible form. As used herein,
15 "audiovisual programming" or "audiovisual signal" includes video and audio signals, whether transmitted alone or in combination as well as data, games (or other programs), graphics, control, telephony, text or other information independent of format. This
20 programming may be transmitted from the programming provider to the authorized subscribers by wire or broadcast within the meaning of the present invention. As used herein, "set top box" is intended to broadly include satellite receivers, LMDS or MMDS or any IRD
25 (integrated receiver/decoder).

A typical design for a set top box is illustrated in Fig. 1. As shown in Fig. 1, a conventional set top box 100 receives an input audiovisual signal through an input terminal 102. The signal received at input
30 terminal 102 is provided to a standard function circuit 101.

The standard function circuit 101 contains the necessary circuitry, decryption keys, etc. to decode the audiovisual signal received through input terminal
35 102. Alternatively, the function circuit 101 may

enhance the audiovisual signal. The standard function circuit 101 converts the input signal to a form in which it can be intelligently perceived when supplied to a monitor, tuner, television or other receiver
5 device. The decoded signal is output by the standard function circuit 101 to an output terminal 103. The receiver device (not shown) is then connected to the output terminal 103.

The set top box 100 also includes a power
10 controller 104 which receives power from a power input terminal 105. The power controller 104 provides power from the power input terminal 105 to the standard function circuit 101. In this manner, the set top box 100 allows the authorized subscriber who possess it to
15 receive and use the transmitted audiovisual signal.

However, the set top box 100 and standard function circuit 101 may readily become obsolete for a variety of reasons. For example, in the interests of security, the method of encoding and decoding the audiovisual
20 signal may be periodically changed by the signal provider. Similarly, the signal provider may simply upgrade the encoding system periodically to incorporate new features and functions. The service provider may also offer additional channels of audiovisual signals
25 which are encoded using new or different methods. If the function circuit is enhancing the audiovisual signal, better methods of performing the enhancement may become available.

Additionally, the standard function circuit 101
30 may simply malfunction or become damaged. In any of these instances, the standard function circuit 101 will no longer allow the authorized subscriber to completely or optimally receive the audiovisual signals transmitted by the provider.

The solution to this problem in the past has been to provide authorized subscribers with a new set top box containing an updated standard function circuit. The updated function circuit is designed to fully
5 receive and translate the signals transmitted by the signal provider.

However, this solution is obviously expensive and time consuming, especially if authorized subscribers are widely spread over a large geographic region.
10 Thus, there is a need in the art for a method and apparatus of readily and inexpensively upgrading set top boxes in the field.

SUMMARY OF THE INVENTION

It is an object of the present invention to meet
15 the above-described needs and others. Specifically, it is an object of the present invention to provide a method and apparatus for readily upgrading set top boxes in the field.

Additional objects, advantages and novel features
20 of the invention will be set forth in the description which follows or may be learned by those skilled in the art through reading these materials or practicing the invention. The objects and advantages of the invention may be achieved through the means recited in the
25 attached claims.

To achieve the stated and other objects of the present invention, as embodied and described below, the invention may include an upgradeable set top box having: an input terminal for inputting an audiovisual
30 signal; an output terminal for outputting a processed audiovisual signal; and a port having a connector for receiving a function circuit module and connecting a function circuit of the module between the input terminal and the output terminal. The function circuit
35 receives the audiovisual signal from the input terminal

and outputs the processed audiovisual signal to the output terminal.

The set top box of the present invention may also incorporate a connection sensor for detecting whether a function circuit module is present in the port. A power controller may selectively provide power to the function circuit module present in the port as determined by the connection sensor. If a standard function circuit is already present in the set top box, the power controller ceases to provide power to the standard function circuit when a function circuit module is present in the port as determined by the connection sensor.

The present invention also encompasses the self-contained function circuit module which includes: a function circuit for receiving an audiovisual signal and outputting a processed audiovisual signal; and a connector for connecting the function circuit to a port of a set top box. The connector has connections for providing power and the audiovisual signal to the function circuit, and for outputting the processed audiovisual signal from the function circuit when the module is connected to the set top box.

The processed audiovisual signal output by the function circuit may be a decoded or an enhanced audiovisual signal.

The present invention also encompasses a method of upgrading or replacing a function circuit of a set top box. The method includes connecting a self-contained module having a function circuit therein in a port of the set top box so that the function circuit receives an input audiovisual signal through the port and outputs a processed audiovisual signal through the port.

Where a standard function circuit is already disposed in the set top box, the method will include bypassing the standard function circuit after the connection of the module is performed. The bypassing
5 may include cutting power to the standard function circuit.

The method of the present invention may also include detecting connection of the module in the port and initiating the bypassing in response.
10 Additionally, to signal the connection of the module, the method may include actuating a switch in performing the connecting to initiate the bypassing.

Finally, the method of the present invention may include decoding or enhancing the input audiovisual
15 signal with the function circuit to generate the processed audiovisual signal.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the present invention and are a part of the specification.
20 Together with the following description, the drawings demonstrate and explain the principles of the present invention.

Fig. 1 is a block diagram of a conventional set top box.
25 Fig. 2 is a block diagram of a first embodiment of the present invention incorporated into set top box.

Fig. 3 is a block diagram of a second embodiment of the present invention in a set top box.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Using the drawings, the preferred embodiments of the present invention will now be explained.

A basic premise of the present invention is to
5 provide a function circuit for a set top box that is incorporated into a self-contained module which can be plugged into a set top box and thereby become the standard function circuit or bypass and replace a standard function circuit existing in the set top box.

10 As shown in Fig. 2, a set top box 200 of the present invention includes an audiovisual signal input terminal 102 which allows an input signal to be delivered to the standard function circuit 101. As in the device shown in Fig. 1, the standard function
15 circuit 101 performs a function on the input signal, e.g. decodes or otherwise enhances the signal, and outputs the processed signal to a receiver device through output terminal 103.

Power is provided through power input terminal 105
20 to a power controller 104. Under normal operating conditions, the power controller 104 provides power from terminal 105 to the standard function circuit 101 to power that circuit.

The set top box 200 of the present invention also
25 includes a port 206. Disposed in the port 206 is a connector 207, e.g. pin receiving holes, for connecting an external function circuit module 201 to the circuitry of the set top box 200. The
upgrade/replacement function circuit module 201 is a
30 self-contained function circuit that replaces, and likely improves upon, the standard function circuit 101. The function circuit module 201 will be provided with a connector, e.g. pins, for connecting the improved function circuit onboard the module 201 to the

circuitry of the set top box 200 through the connector 207 in the port 206.

5 The set top box 200 includes a connection sensor 202 that determines when an upgraded function circuit module 201 has been connected in the port 206. The connection sensor 202 may be a wide variety of equivalent devices for detecting the presence of the circuit module 201. For example, the connection sensor 202 may incorporate a switch which is actuated by a user when the user inserts the model 201 in the port 206. Similarly, the connection sensor 202 may incorporate a switch which is actuated by the act of connecting the module 201 to the port 206. The connection sensor 202 may alternatively incorporate an optical sensor which, due the reflection of a light by the inserted module 201 or the occlusion of a light beam by the inserted module 201, registers the presence of the function circuit module 201 in the port 206. Many other equivalent methods and means for detecting the function circuit module in the port 206 will be apparent to those skilled in the art and are considered within the scope of the present invention.

20 When the connection sensor 202 registers the presence of the function circuit module 201 in the port 206, the connection sensor 202 signals the power controller 104. In response, the power controller 104 ceases to provide power to the standard function circuit 101. Instead, the power controller 104 provides power over line 205 to the port 206 and, ultimately, to the function circuit onboard the function circuit module 201.

30 The input audiovisual signal is also provided via line 203 to the port 206 and, ultimately, to the upgraded or replacement function circuit 201. Through the connector 207, via line 204, the upgraded function

circuit 201 can output a processed audiovisual signal to the output terminal 103 and, ultimately, to a receiver (not shown).

In this way, the standard function circuit 101
5 which has become obsolete or has malfunctioned is completely bypassed and replaced by the upgraded or replacement function circuit 201. As will be readily apparent, the present invention allows a set top box to be readily and less expensively upgraded by simply
10 providing the authorized subscriber with an upgraded function circuit module 201 that can be plugged into the port 206.

Fig. 3 illustrates a second embodiment of the present invention which is similar in many respects.
15 However, the embodiment of the present invention includes a set top box 300 in which no standard function circuit is provided. This decreases the cost of manufacturing the set top box initially.

Instead of permitting the user to bypass an
20 existing standard function circuit as in Fig. 2, the set top box 300 of Fig. 3 makes exclusive use of a function circuit provided in a module 301. The input audiovisual signal is provided, via line 303, from the input terminal 102 to the port 206 and, ultimately, to
25 the function circuit 301. A output signal, which has been processed by the function circuit 301, is output via line 304 to the output terminal 103.

The embodiment shown in Fig. 3 may include the connection sensor 202 described above in order to
30 prevent the power controller 104 from needlessly providing power to the port 206 when no function circuit module 301 is inserted.

The preceding description has been presented only to illustrate and describe the invention. It is not
35 intended to be exhaustive or to limit the invention to

any precise form disclosed. Many modifications and variations are possible in light of the above teaching.

The preferred embodiment was chosen and described in order to best explain the principles of the invention and its practical application. The preceding description is intended to enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. It is intended that the scope of the invention be defined by the following claims.

WHAT IS CLAIMED IS:

1. An upgradeable set top box comprising:
an input terminal for inputting an
audiovisual signal;
an output terminal for outputting a processed
5 audiovisual signal; and
a port having a connector for receiving a
function circuit module therein and connecting a
function circuit of said module between said input
terminal and said output terminal,
10 wherein said function circuit receives said
audiovisual signal from said input terminal and outputs
said processed audiovisual signal to said output
terminal.
2. A set top box as claimed in claim 1, further
15 comprising a connection sensor for detecting whether a
function circuit module is present in said port.
3. A set top box as claimed in claim 2, further
comprising a power controller for selectively providing
power to a function circuit module present in said port
20 as determined by said connection sensor.
4. A set top box as claimed in claim 3, wherein
said power controller ceases to provide power to a
standard function circuit disposed in said set top box
when a function circuit module is present in said port
25 as determined by said connection sensor.
5. A set top box as claimed in claim 1, further
comprising a self-contained function circuit module
comprising:
a function circuit for receiving an
30 audiovisual signal and outputting a processed
audiovisual signal; and

a connector for connecting said function circuit to a port of a set top box, said connector having connections for providing power and said audiovisual signal to said function circuit, and for
5 outputting said processed audiovisual signal from said function circuit when said module is connected to said set top box.

6. A set top box as claimed in claim 1, wherein said processed audiovisual signal is a decoded
10 audiovisual signal.

7. A set top box as claimed in claim 1, wherein said processed audiovisual signal is an enhanced audiovisual signal.

8. A self-contained function circuit module for
15 upgrading a set top box comprising:

a function circuit for receiving an audiovisual signal and outputting a processed audiovisual signal; and

a connector for connecting said function
20 circuit to a port of a set top box, said connector having connections for providing power and said audiovisual signal to said function circuit, and for outputting said processed audiovisual signal from said function circuit when said module is connected to said
25 set top box.

9. A method of upgrading or replacing a function circuit of a set top box comprising connecting a self-contained module having a function circuit therein to a first port of said set top box so that said function
30 circuit receives an input audiovisual signal through said first port and outputs a processed audiovisual signal through a second port.

10. A method as claimed in claim 9, wherein said first port and said second port are the same.

35

11. A method as claimed in claim 9, further comprising bypassing a standard function circuit disposed in said set top box after said connecting is performed.

5 12. A method as claimed in claim 10, wherein said bypassing comprises cutting power to said standard function circuit.

10 13. A method as claimed in claim 10, further comprising detecting connection of said module in said port and initiating said bypassing in response to said detecting.

14. A method as claimed in claim 10, further comprising actuating a switch in performing said connecting to initiate said bypassing.

15 15. A method as claimed in claim 9, further comprising decoding said input audiovisual signal with said function circuit to generate said processed audiovisual signal.

20 16. A method as claimed in claim 9, further comprising enhancing said input audiovisual signal with said function circuit to generate said processed audiovisual signal.

1/3

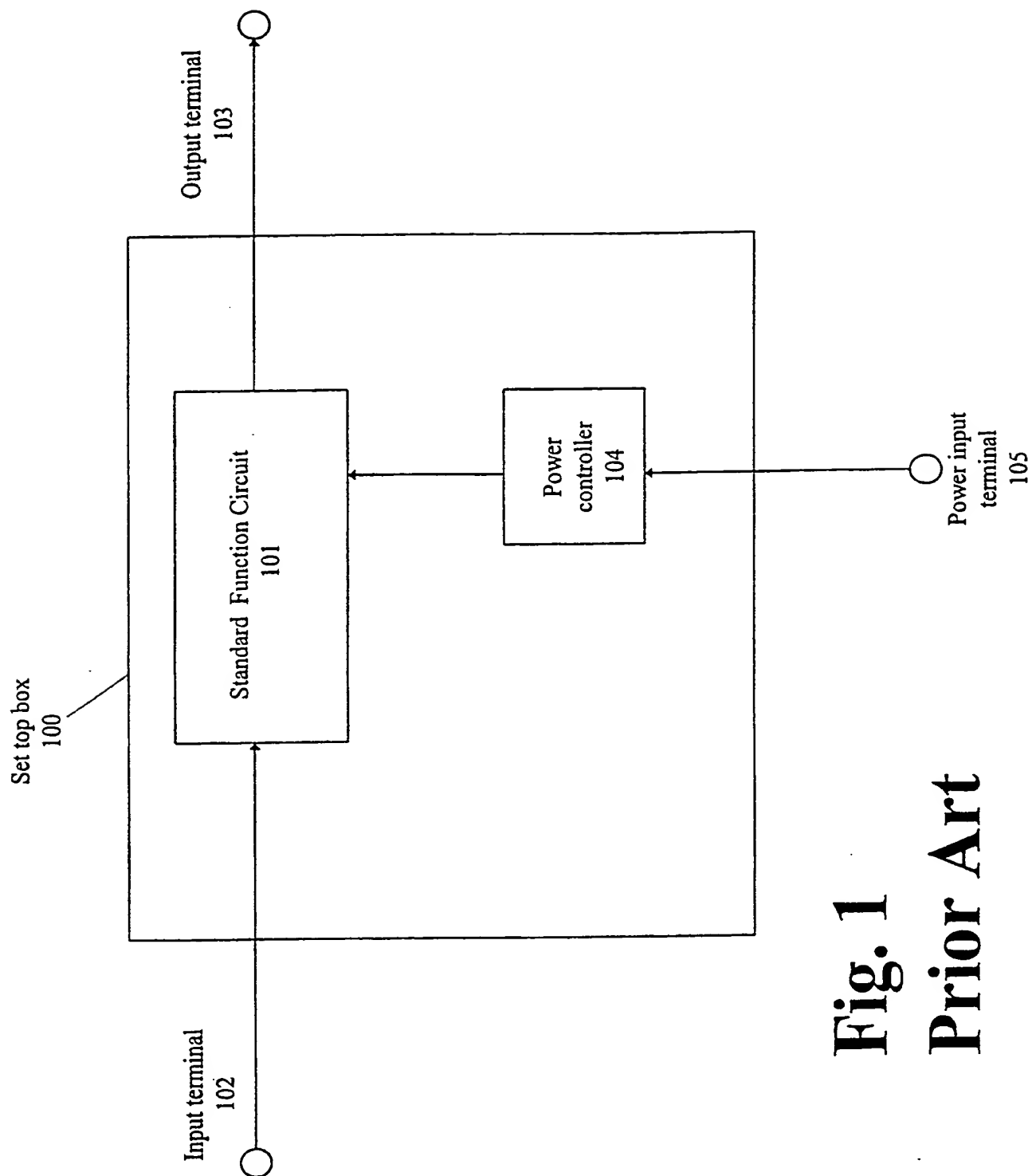
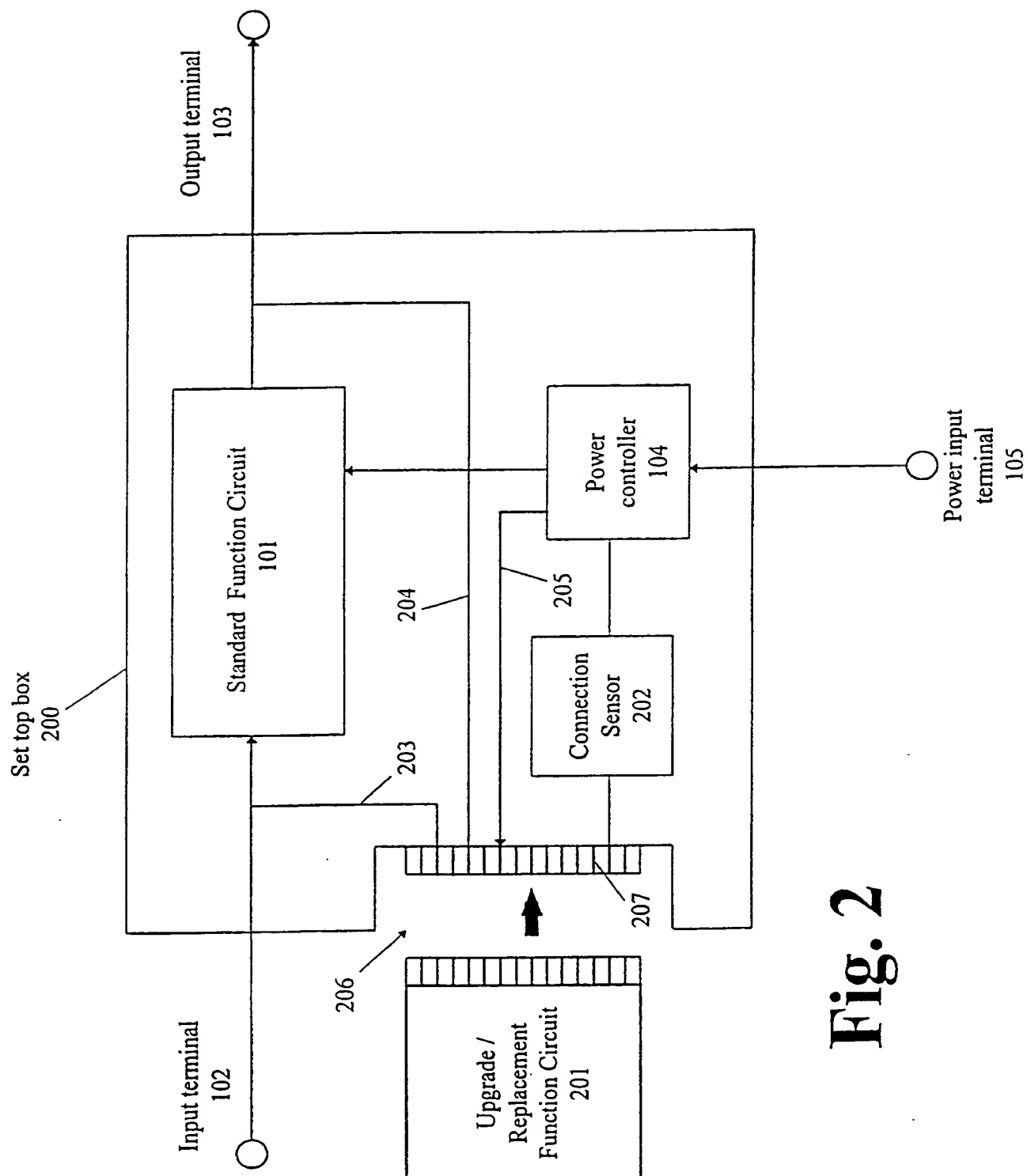


Fig. 1
Prior Art

2 / 3

**Fig. 2**

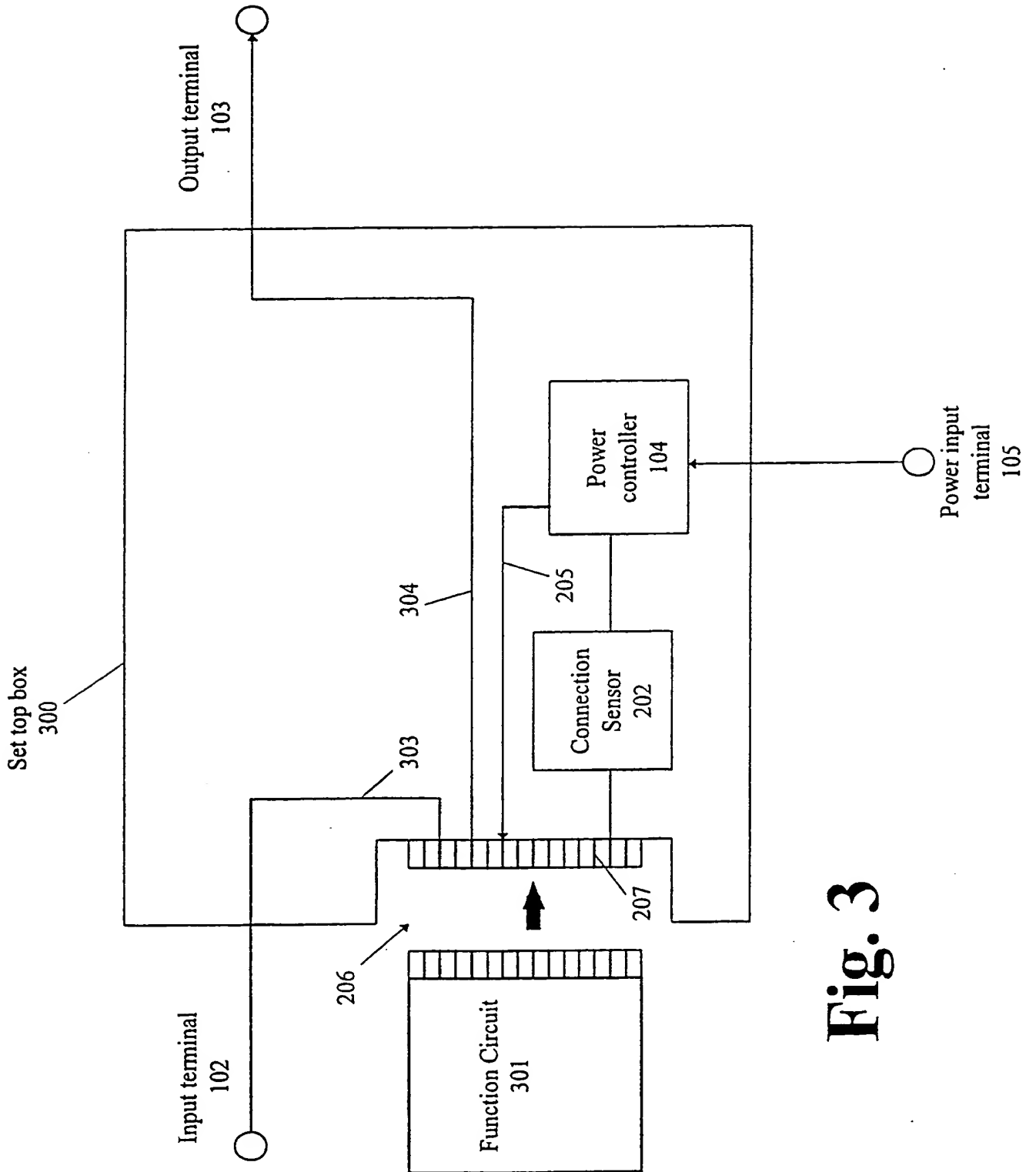


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/22686

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : Please See Extra Sheet.

US CL : Please See Extra Sheet.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,696,034 A (WIEDEMER) 22 September 1987, see whole document.	1-16
Y	US 5,003,591 A (KAUFFMAN et al) 26 March 1991, see whole document.	1-16
Y	US 5,367,571 A (BOWEN et al) 22 November 1994, see whole document.	1-16
Y	US 5,440,632 A (BACON et al) 08 August 1995, see whole document.	1-16

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

A	document defining the general state of the art which is not considered to be of particular relevance	*T*	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
B	earlier document published on or after the international filing date	*X*	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
L	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Y*	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
O	document referring to an oral disclosure, use, exhibition or other means	*A*	document member of the same patent family
P	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

10 FEBRUARY 1999

Date of mailing of the international search report

22 FEB 1999

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

JOHN W. MILLER

Telephone No. (703) 305-4795

Form PCT/ISA/210 (second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/22686

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,559,549 A (HENDRICKS et al) 24 September 1996, see whole document.	1-16

Form PCT/ISA/210 (continuation of second sheet)(July 1992)*

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/22686

A. CLASSIFICATION OF SUBJECT MATTER:
IPC (6):

H04H 1/02; H04N 7/10

A. CLASSIFICATION OF SUBJECT MATTER:
US CL

348/10; 455/6.2

B. FIELDS SEARCHED

Minimum documentation searched

Classification System: U.S.

348/5.5, 6, 7, 10, 11, 12, 13, 553, 571, 725, 726, 727, 728, 730; 455/3.1, 3.2, 4.1, 4.2, 5.1, 6.1, 6.2

Form PCT/ISA/210 (extra sheet)(July 1992)*

This Page Blank (uspto)